Teacher Lesson Plan

OBJECTIVES	Students will learn about the environment, agriculture, and warfare of the Classic Maya, and relate them to current theories explaining the collapse of Classic Maya civilization. Students will also learn about using archaeological evidence to test social scientific hypotheses.

MATERIALS	Provided by Classroom Teacher:
	Large classroom map showing Mexico and Central America
	Included in this Lesson Plan (make one copy per student)
	    Student Overview: Collapse of the Classic Maya
	    Map of the Maya Region
	    Interpreting Archaeological Data: Theory 1: Drought, Theory 2: Agriculture, Theory 3: Warfare, Post-Activity Conclusions

DIRECTIONS	On a large map, show the Classic Maya region (southern Mexico, Belize, Honduras, Guatemala). Tell students they are studying the ancestors of the present day Maya, the indigenous people of this region. Pass out the **Student Overview** to each student. Choose students to each read one paragraph of the **Student Overview** out loud to the class, and instruct the rest of the class to read along. Pass out the **Map of the Maya Region** and have the students fill in the map according to the instructions. Pass out one copy of each **Interpreting Archaeological Data** handout to each student. Work through the questions and discuss as a class.
FURTHER STUDY	Have students read about the cosmology, writing system, and calendars of the Classic Maya civilization.
SO WHAT?	By understanding how societies are an integrated system for providing necessities (water, food, and shelter), students learn how failure in one area affects the rest, and can lead to the downfall of civilizations.
EDUCATION STANDARDS	This lesson plan can be used to fulfill state and national education standards in Social Science (World History & Geography), Life Science (Earth Sciences), and Language Arts (Reading, Reading Comprehension, Listening and Speaking). This lesson plan fulfills California State Education Content Standards in Social Sciences for grade 7 (7.7.1), and Science for grade 7 (7.7.C).

This lesson plan was developed by Education Intern Emily Keehn (UCSD, Spring 2005) and Museum of Man Education Department staff.

Student Overview: Collapse of the Classic Maya

During the **Classic Period**, the ancient Maya were a flourishing people, with well-developed trade routes, a sophisticated number and writing system, intricately carved monumental architecture, and a complex **cosmology**. Most Maya during this period lived in an area called the Southern Lowlands (see accompanying map) that includes parts of Guatemala, Honduras, Belize, and southern Mexico. However, approaching A.D. 900, the Classic Maya civilization in the Southern Lowlands was collapsing, with the population there lowering by an estimated 67–93%.

Archaeologists currently researching the collapse of the Classic Maya seek to explain what caused this great civilization to decline so suddenly. The three main reasons for the collapse that are argued about today are climate change, poor agriculture, and warfare. These three reasons, also called theories, correspond to the three-part system of water, food, and shelter that people need to survive. In order to flourish, societies must provide for and balance these three factors. If one of these factors is absent or threatened, the other two are affected, and the results can be catastrophic.

The theory that climate change caused the Classic Maya collapse focuses on a series of powerful and long-lasting droughts that may have returned to the Maya region approximately every 208 years. This 208-year cycle intensified around A.D. 800—900, with four especially destructive droughts. These droughts may have triggered crop failure, disease, malnutrition, warfare, and famine throughout the region, but the effects were probably strongest in the Southern Lowlands. In the Northern Lowlands, there are many underground sources of water called **cenotes**. Also, the **water table** is higher there than in the rest of the Maya region. So even though the Southern Lowlands and Highlands have more rainfall on average than the Northern Lowlands, when heavy droughts occurred, the rain-catching reservoirs in the south would dry up, leaving the inhabitants there with no water. Since the Northern Lowlands were not affected as strongly by these droughts, it is thought that the remaining populations from the southern regions moved north to live.

Classic Period: a period in Ancient Maya history from A.D. 250—900.

Cosmology: beliefs about the origin and nature of the universe.

Cenotes: sinkholes connected to underground rivers.

Water table: the level where underground water can be reached.

Student Overview: Collapse of the Classic Maya (cont.)

The second theory focuses on Classic Maya agriculture. Some archaeologists believe the ancient Maya used poor agricultural techniques including slash-and-burn farming, mono-cropping, and over-expanded farming. In **slash-and-burn farming**, the ash from burned trees covers the soil with nutrients. But these nutrients only last a few seasons, at which point the soil is depleted and a new area of forest must be cleared. The Maya also had a very small range of crops and grew mainly maize. This is called mono-cropping. As an agricultural technique, mono-cropping is vulnerable to pests and disease, and can quickly deplete key nutrients from the soil. In addition, population growth led to an over-expansion of farming into areas that could not support agriculture. This resulted in increased deforestation, which led to faster nutrient depletion as well as **soil erosion**. These factors combined to make it increasingly difficult for the Classic Maya to successfully grow crops.

The third theory revolves around warfare. From A.D. 205–600, it is believed that Mayan warfare was more or less restricted to the kings and other royals: they were kidnapped by rivals as a means of absorbing their power as rulers. However, in the late Classic period, the **Toltec** people infiltrated the Mayan territory and influenced their culture, including how the Mayan elite waged war. Maya rulers began to involve large segments of the population in war. With entire communities engaged in warfare, fields were left fallow and water control systems deteriorated.

Classic Maya kings were also believed to be gods on Earth. As such, they were responsible for bringing rain to their land and ensuring that enough food was produced. This belief system worked well when resources were bountiful, but when they were not, some people may have turned against their kings in anger. Others may have fled city centers to escape their dissatisfaction. Maya leaders fought among themselves as well, and many began wars to expand their territories. When resources were scarce, regional centers most likely waged wars against one another to compete for food and water. The shortage of food and water, combined with the wars between regional centers, helped to trigger a collapse in their civilization.

Slash-and-burn farming: burning down an area of forest to clear it for farming.

Soil erosion: the wearing away of top soil that has been loosened by farming, deforestation, and/or natural means.

Toltec: a militaristic culture from central Mexico. The Toltecs conquered the Maya city of Chichen Itza in the 10th century A.D.
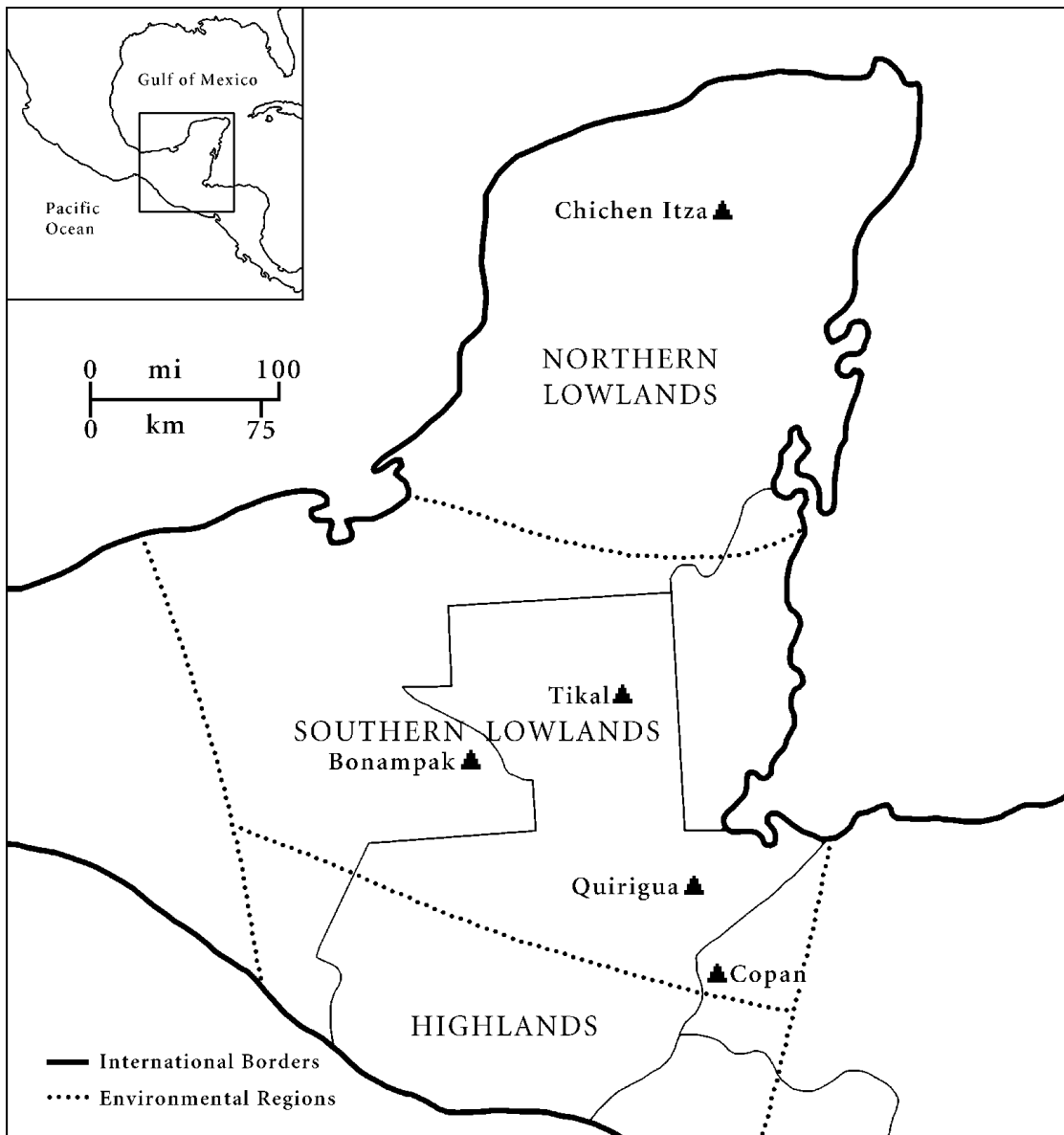
Map of the Maya Region

This is a map of the Maya country, broken down into three environmental regions: the *Northern Lowlands*, the *Southern Lowlands*, and the *Highlands*. The lowlands are characterized by thick limestone bedrock that absorbs much of the rainfall that falls there. The Highlands are mountainous with some volcanoes.

The Northern Lowlands are dry and desert-like with thorny shrub-like forests.
The Southern Lowlands receive high rainfall and are covered in a tropical rainforest.
The Highlands are covered in a lush forest and receive lots of rain.

1. The solid lines represent borders between different countries. Fill in the names of these countries on the map: Mexico, Guatemala, Belize, and Honduras.
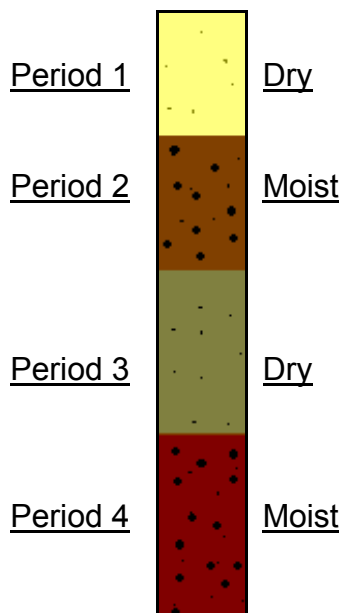2. Color each environmental region of the map a different color.

Interpreting Archaeological Data

Theory 1: Drought

Theory: To archaeologists who defend the theory that drought caused the collapse of the Classic Maya, the environment was the deciding factor in their civilization's collapse. These scientists believe the environment controls the development and decline of societies.

Archaeological Data and Testing the Theory: Recently, a team of archaeologists went to the Maya region and took core samples of the sediment from lakes in the region. These soil samples came from deep under the lake bottoms. By examining these samples, they concluded that there was a cyclical drought that returned to the Maya region approximately every 208 years—intensifying around the time of the Maya collapse. Can you figure out how these archaeologists analyzed their data to come to this conclusion?

Questions: What happens to the grass and the soil on your lawn when the weather is very hot and dry, with very little rainfall for a long period of time? When the soil in your garden is really dry, are there enough nutrients in the soil for plants to grow healthily?

Period 1 — Dry

Period 2 — Moist

Period 3 — Dry

Period 4 — Moist

This picture to the left represents a sediment sample that archaeologists study to test the drought theory.

- The different colors represent different layers of soil with different moisture levels. Each period represents a time span of 200 years. The black spots represent pollen from plants.
- The layer on the top, Period 1, represents the most recent period of time, and the layer on the bottom, Period 4 represents a period much further in the past.
- Archaeologists measure the amount of pollen found in the sediment of each period to see whether it was a period lush with plants or not. What do you think the high concentration of pollen in Period 2 tells you about the climate during this time?
- Examining this image, what can you conclude about the climate of each period?

Conclusion: From looking at the sediment samples, you now know that there were differing periods of moist climates and dry climates. What is your opinion? Do you think the drought theory is correct and that a prolonged dry climate was enough to make the Classic Maya collapse? Do you think people could have adapted to the dry climate? Explain below.

Interpreting Archaeological Data

Theory 2: Agriculture

Theory: Archaeologists who believe that agricultural strains caused the collapse of the Classic Maya think the Maya used unsustainable agricultural techniques that led to an inability to grow enough crops to support their society. This, they believe, led to increased deaths from malnutrition and disease.

Archaeological Data and Testing the Theory: Archaeologists who test this theory look at the human bones of the Classic Maya population. These bones provide clues to diseases that affected the people when they were alive. These researchers believe these bones show that many Maya were increasingly plagued by disease and malnutrition at the time of the collapse. How did these archaeologists analyze their data to come to this conclusion?

Questions: What happens when you don't eat a balanced diet? What happens to your teeth when you eat too many sweets? Do you think that what you eat and your overall health affects what your bones look like? Can you think of any illnesses that affect your bones?

Archaeologists might study a bone like this one to see whether the person it belonged to was healthy or not.

Some more things to think about:
• Is a study of skeletal remains enough to come to a conclusion about the agricultural theory?
• Do you think that people in the past were as healthy as people today?
• Would it be more common for people to be afflicted by certain diseases in the past than is common today?

Conclusion: If you were an archaeologist who studied the skeletal remains of a large portion of the Classic Maya population and you found that many of them were diseased or malnourished, would you support the agricultural theory for collapse? Explain below.

Interpreting Archaeological Data

Theory 3: Warfare

Theory: Archaeologists who support the warfare theory believe that changes in how the Classic Maya fought wars—from initially only involving the elite to later involving large parts of the population—were destructive to their society. The cosmological belief that their kings were responsible for the rain and crops also proved to be destructive during periods when there were droughts or crop failures.

Archaeological Data and Testing the Theory: One important source of information for testing this theory is in the form of writing. Specialists who are trained in reading ancient Maya glyphs have translated the abundant stone carvings that tell tales of epic battles between different Maya city-states.

Questions: Where can you find and read messages from the leaders of your country? Where can you read about a historic event such as a war? Who gets to write the history of the war: the victors or the defeated?

This is a stone lintel from Bonampak, illustrating the victor with a trophy skull on his chest, and the captive stripped of finery and held firmly by his hair—a sign of defeat.

- How could we tell if the nature of their warfare changed? Do you think the stories of the wars would report this change?
- Since the victors get to write the histories of wars, do you think that the stories you read will always be accurate, or will the stories be described in ways that are not always truthful, and instead favor the victors?
- Other evidence can be found by studying architecture. Some sites show that fortification walls were added to existing architecture to enable the Maya to defend their cities against large-scale attacks.

Conclusion: Do you think this theory is correct? Explain why or why not.

Interpreting Archaeological Data

Post-Activity Conclusions

The examples of archaeological evidence you have just finished analyzing are just three pieces of a very large puzzle that archaeologists try to piece together to understand the complex events that led to the Maya collapse. Notice that different types of evidence are needed to test each theory.

Now, think of ONE additional piece of archaeological evidence to look for in support of each theory:

Theory 1._____

Theory 2._____

Theory 3._____

As a class, list the evidence for each of the three theories for the collapse and compare. Which theory looks the strongest? Which looks the weakest?
Can you think of any evidence that might contradict or disprove any of these theories?

Conclusion
Now that you have closely examined three theories explaining the Classic Maya collapse, it is your turn to write a summary explaining why you think their civilization collapsed.

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Teacher Answer Sheet

Map of the Maya Region
> *Starting from the top left going clockwise: Mexico, Belize, Honduras, and Guatemala.*

Theory 1– Drought
What do you think the high concentration of pollen in Period 2 tells you about the climate during this time?
> *This is evidence of high rainfall and lush vegetation. Measuring the concentration of pollen is one of several things that archaeologists and climatologists look at when reconstructing ancient environments. For further information read Hodell et al. "Solar Forcing of Drought Frequency in the Maya Lowlands," Science v.292: pp.1367-1370, 2001.*

What can you conclude about the climate of each period?
> *The higher concentrations of pollen in Periods 2 and 4 indicate they were moister and more densely vegetated periods. Periods 1 and 3 were drier, implying that there may have been a drought during these periods.*

Theory 2– Agriculture
Can you think of any illnesses that affect your bones?
> *Examples are anemia and scurvy, both of which affected the Classic Maya. Anemia is caused by having too few red blood cells, and is commonly caused by a diet low in iron. Scurvy is caused by deficiency of vitamin C.*

Is a study of skeletal remains enough to come to a conclusion about the agricultural theory?
> *Archaeologists might also look at Classic Mayan agricultural tools, as well as food remains that might be found in hearths where they cooked food.*

Do you think that people in the past were as healthy as people today? Would it be more common for people to be afflicted by certain diseases in the past than it is today?
> *The Classic Maya were probably not as healthy as people today because of a diet low in protein and lacking a wide range of vegetables. They were affected by diseases that today we can prevent and/or more easily treat.*

Theory 3- Warfare
How could we tell if the nature of their warfare changed? Do you think the stories of the wars would report this change?
> *The victory stelae and other stone carvings would depict battles including larger groups of people, rather than fighting between rulers.*

Teacher Answer Sheet (cont.)

Since the victors get to write the histories of wars, do you think that the stories you read will always be accurate, or will the stories be described in ways that are not always truthful, and instead favor the victors?

> *The stories would not be completely accurate—they would be biased and glorify the victorious ruler. The stories would help to establish his legitimacy as the ruler of the newly conquered areas. This is why it is necessary to look for more objective evidence such as changes in their architecture to include fortification for large battles, etc.*

Post-Activity Conclusions
Think of ONE additional piece of archaeological evidence for each theory.

> *Examples of other pieces of evidence may be tools for agriculture, animal bones to understand what kind of meat they ate or what animals were domesticated at the time, and defensive architecture to see if they built more fortifications to defend themselves against large scale attacks.*

Can you think of any evidence that might contradict or disprove the theories?

> *Examples might be as simple as further investigations of human bones to measure whether there was a spike in disease or earlier deaths. Another might be finding evidence that the civilization adapted to climate change.*

Conclusion. Please read this, or summarize this for your class after they have written their own conclusions.

> *The Classic Maya civilization was complex with a very large population. They had a sophisticated writing and numbering system, a calendar, and religious beliefs that were incorporated into all aspects of their lives. Such a complex and grand civilization most likely did not collapse because of only one reason. However, problems in one part of their social system would have affected other parts as well. The three theories for the collapse of the Classic Maya are just that,* theories. *We do not know definitively which one of the three caused the collapse, or which one was the most important. It is likely that all three factors had a significant effect. Though we do not have a conclusive answer to the mystery of the Maya collapse, we can always look for more evidence and create new theories, or make the existing theories better.*

For further reading:
Gill, R. B. *The Great Maya Droughts: Water, Life, & Death*. Albuquerque: University
    of New Mexico Press, 2000.
Shaw, Justine M. "Climate Change and Deforestation: Implications for the Maya Collapse."
    Ancient Mesoamerica v. 14 no. 1: pp 157-167. 2003
Webster, D. "The Not So Peaceful Civilization: A Review of Maya War." *Journal of
    World Prehistory* v. 14 no. 1: pp. 65-119, 2000.
Wright, L.E. "Biological Perspectives on the Collapse of the Pasion Maya." *Ancient
    Mesoamerica* v. 8: pp. 267-273, 1997.